Short-term Prediction Research and Transition (SPoRT)

SPoRT is focused on transitioning unique NASA and NOAA observations and research capabilities to the operational weather community to improve short-term weather forecasts on a regional and local scale.

- close collaboration with numerous WFOs across the country
- SPoRT activities began in 2002, first products to AWIPS in 2003
- co-funded by NOAA since 2009 through "proving ground" activities

Proven paradigm for transition of research and experimental data to "operations"

Benefit

- **demonstrate capability of NASA and NOAA experimental products to weather applications and societal benefit**
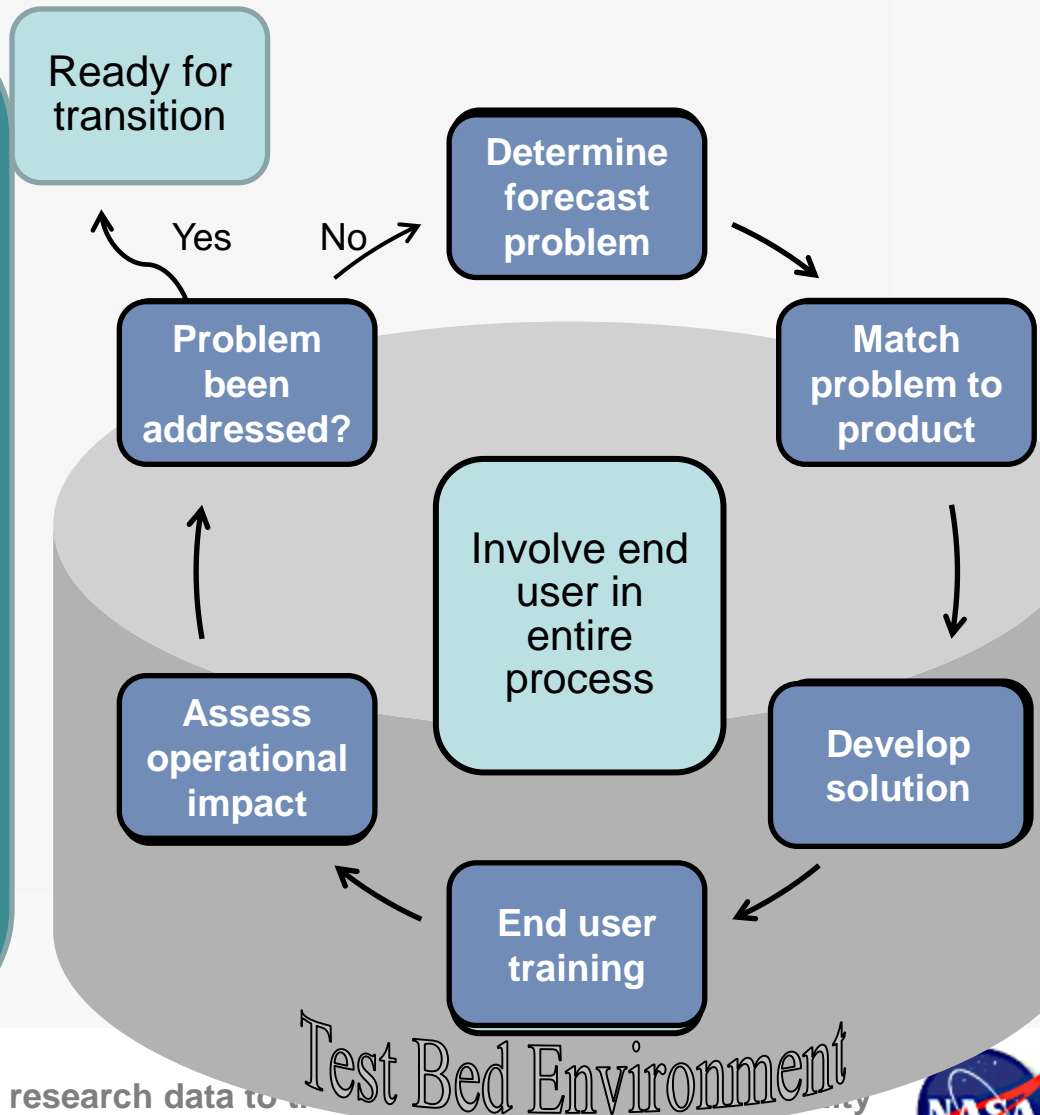- **prepares forecasters for use of data from next generation of operational satellites (JPSS, GOES-R)**

Research Data / Products to "Operations"

SPoRT Paradigm

- match forecast challenge to data/product
- develop solution / demonstrate in "test bed" environment
- integrate successful products into end user's decision support tools
- create product training
- perform product assessment

Maintain interactive partnership with end user throughout process

Need local end user advocate

Ready for transition

Determine forecast problem

Yes   No

Match problem to product

Problem been addressed?

Involve end user in entire process

Assess operational impact

Develop solution

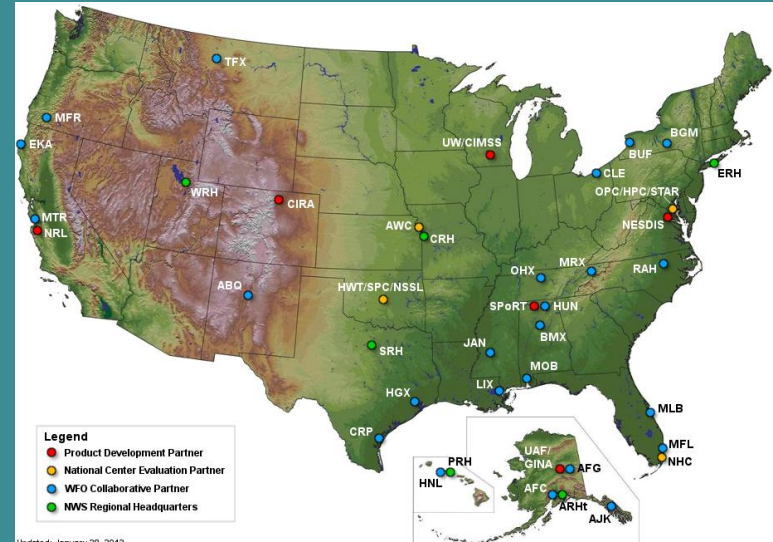End user training

Test Bed Environment

Partnerships and End Users

Partnered with NOAA / University community / DoD

- access to real-time experimental data / products (CIMSS/GINA)
- share expertise and algorithms (CIRA, NRL)

End users

- regular interactions with numerous WFOs
- National Centers

Data / transition / dissemination

- suite of over 40 satellite derived products, analyses, forecast products
- public ftp, Local Data Manager (LDM), WMS
- AWIPS, NAWIPS, AWIPS2, Google Earth, and others

SPoRT Focus and Direction

Address Forecast challenges of operational community

- NASA and NOAA funding
- Strategic plan
- Science Advisory Committee

Products

- MODIS, AIRS, Total Lightning, GOES, JPSS (VIIRS , CrIS), SEVIRI, Passive Microwave, GOES-R proxy products
- Model and forecast products such as NASA/LIS analysis fields and WRF forecasts

ROSES funding to external community

- ROSES 2010
  - o layered PW (CIRA)
  - o enhanced QPE (OU/NSSL)
- ROSES 2013 (due 5/15/13) – 3-4 PI projects

| INSTRUMENT / PRODUCT	FORECAST PROBLEM
MODIS (Terra and Aqua)	
Imagery (visible, 3.9, 6.7, 11 µm)	Improve situational awareness
Suite of RGB products (true, false color snow, air mass, night & day-time microphysics, dust)	Cloud structure, obstructions to visibility, extent of snow cover
Fog / low cloud (11-3.9 µm)	Improve situational awareness
Land and sea surface temperature (LST, SST)	Surface forcing for clouds and convection
SST and ice mask (Great Lakes and Arctic Ocean)	Coastal processes, lake effect precipitation
NDVI / Green Vegetation (GVF)	Model initiation / improved forecasts
AMSR-E (Aqua) / AMSR2 (GCOM)	
Rain rate, cloud water	Coastal weather, data in void regions
SST	Coastal weather
Total Lightning Data (ground-based)	
Source / flash density	Severe weather, lightning safety
Combined Instrument Products	
Multi-sensor SST composite	Short-term weather forecasts
Blended TPW	Moisture mapping, atmospheric rivers, precipitation
HMS/FIRMS fire/burn area	Smoke, reduced visibility, localized flooding
GOES	
NESDIS aviation products	Improve situational awareness
Sounder air mass RGB	Storm dynamics, improved situational awareness
GOES-R Proxy Products	
Pseudo GLM product suite	Severe weather, lightning safety
GOES-MODIS hybrid imagery (visible, 3.9, 6.7, 11µm)	Improved situational awareness
Hybrid RGB suite	Improved situational awareness
Quantitative Precipitation Estimates (QPE)	Precipitation mapping
Convective Initiation (CI) product	Convection, precipitation mapping
JPSS Proxy Products	
VIIRS imagery (visible, 3.9, 11 µm)	Improved situational awareness
Suite of VIIRS RGB products (true, air mass (w/CrIS), night & day-time microphysics, dust)	Cloud structure, obstructions to visibility, storm dynamics
VIIRS DNB (low light) – radiance, reflectance, RGB	Improved situational awareness
SEVIRI	
RGB products (air mass, dust, Saharan Air Layer)	Tropical storm forecasting, storm dynamics
Passive Microwave	
TMI (TRMM) 37(V/H), 85(V/H), composite	Precipitation monitoring, storm dynamics
SSMI(S) 37(V/H), 85(V/H), 91(V)	Precipitation monitoring, storm dynamics
SSMI(S) RGBs – 37/85, 37PCT	Precipitation monitoring, storm dynamics
MISCELLANEOUS	
Land Information System (LIS) – soil moisture	Convective initiation, drought monitoring, flooding
WindSat – Ocean Surface Wind Vectors (OSWV)	Improved situational awareness over oceans
OMI	
NESDIS SO2	Volcanic ash monitoring
AIRS	
Carbon monoxide, ozone imagery	Fires, air quality, storm dynamics

SPoRT

NASA

Product Training

SPoRT training addresses different learning styles by creating a variety of training modules types for end users

- "quick guides" for easy forecaster reference
- science sharing sessions
- short (15-20 minute) self-learning guides (Articulate Presenter modules with audio) currently under development for Suomi NPP

Involve end user in training module development

- user provide relevant examples
- address forecaster concerns / usage
- ownership in process / data

End user understanding leads to additional applications
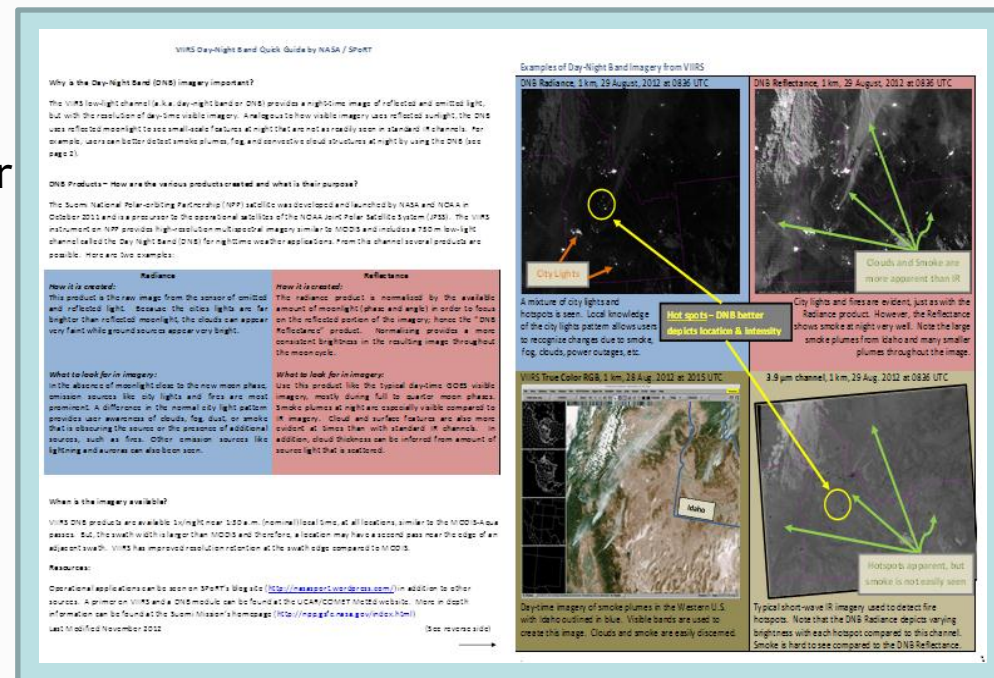
Two-side laminated "Quick Guide" for VIIRS DNB

Collaboration with Other Testbeds

## Atmospheric rivers (with HMT)

- AIRS Level 2 T and q profiles to improve numerical analysis and forecast
  - Use HMT field campaign dropsonde data to verify forecast improvements

- Aid in transition of HMT ensemble forecast precipitation product to AWIPS for West Coast WFOs

- HMT co-authors on AMS conference paper
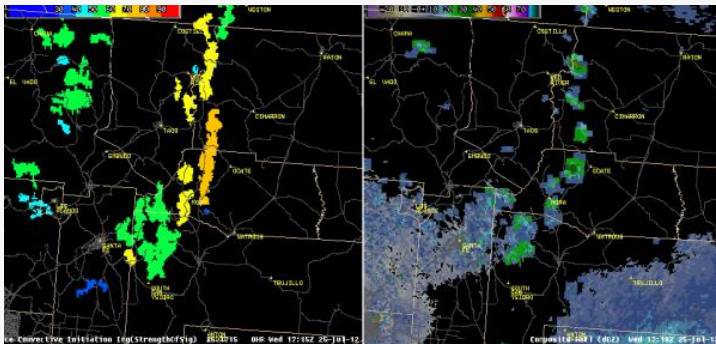
- Planned participation in HMT-SE

TPW forecast sensitivity to assimilation of AIRS profiles (24 hour forecast valid 11 March 2011)
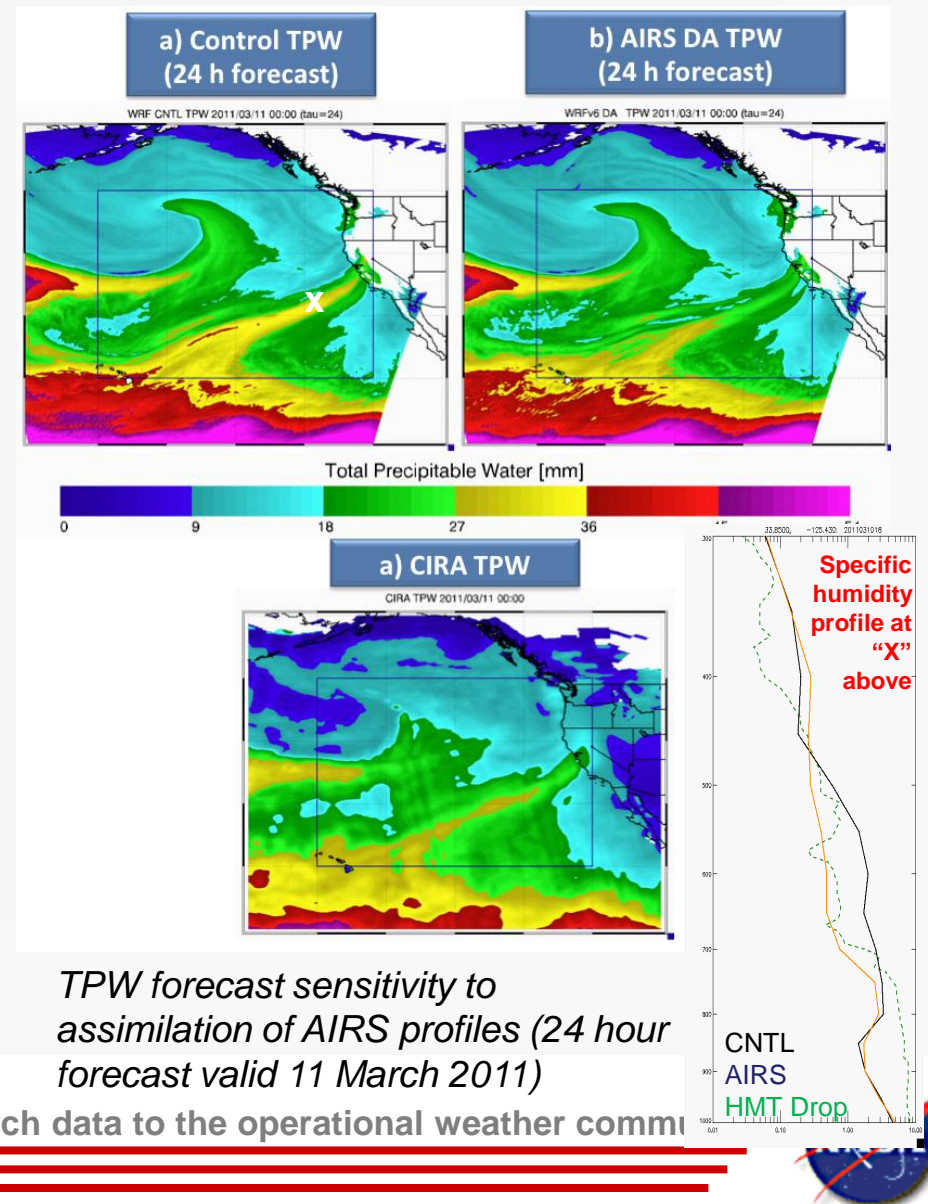
GOES-R Proving Ground / HWT

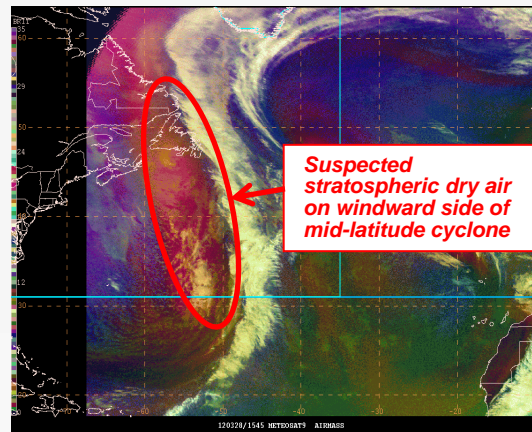## Tailored suite of proxy products for GOES-R ABI and GLM

- GOES-POES hybrid imagery
- SEVIRI and MODIS RGB imagery
- Pseudo GLM product suite
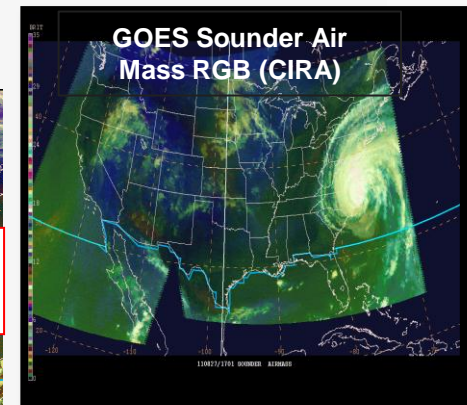- Collaboration with AWGs to transition products (CI, QPE, GOES Sounder air mass RGBs)
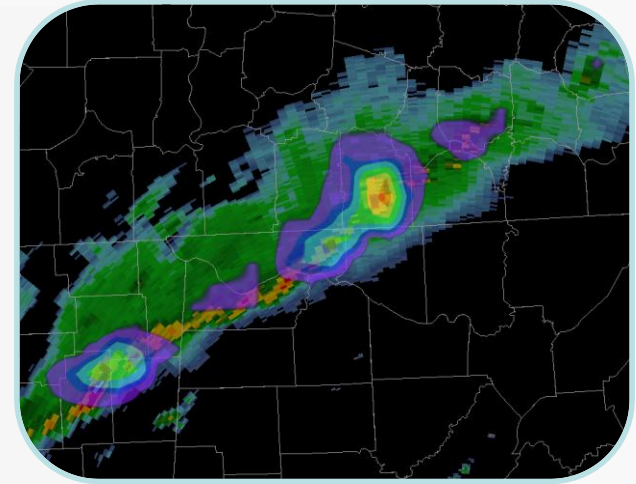
Pseudo GLM evaluated at HWT 2011-2012

Convective Initiation at HWT

Suspected stratospheric dry air on windward side of mid-latitude cyclone

SEVIRI air mass RGB Product from 3/28/2012 at 1545 UTC


GOES Sounder Air Mass RGB (CIRA)

JPSS Proving Ground

Demonstrate the utility of JPSS data to operational weather forecasting

- Transition selected products and capabilities, training, and product assess assessment

- VIIRS, CrIS, OMPS data
  - High resolution imagery
  - DNB low light imagery
  - RGB products (dust, night time microphysics, true color, low cloud / fog, DNB)
  - Fused VIIRS / CrIS (for missing water vapor and ozone channels)

VIIRS/CrIS "air mass" product for Superstorm Sandy
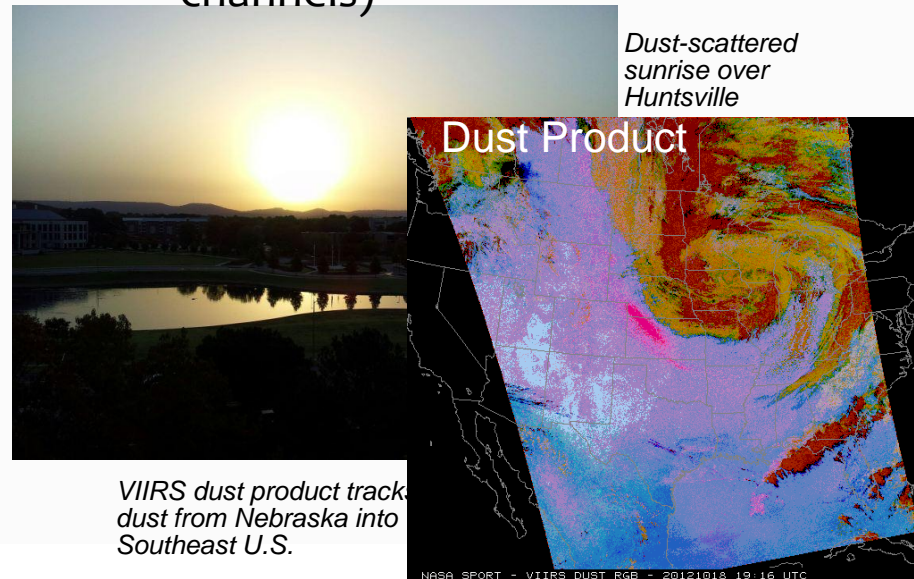
Dust-scattered sunrise over Huntsville
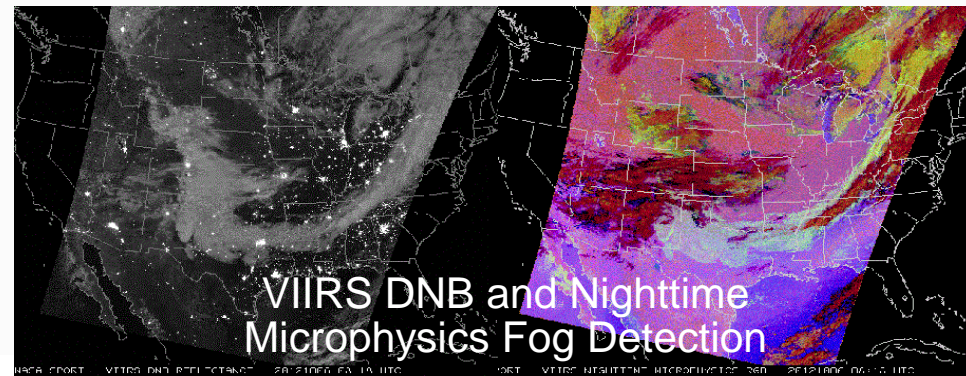
Dust Product

VIIRS dust product track dust from Nebraska into Southeast U.S.


VIIRS DNB and Nighttime Microphysics Fog Detection

AWIPS II Activities at SPoRT

Transition SPoRT products from AWIPS to AWIPS II, and to develop, test, and transition new capabilities to ingest / display satellite / model products which best demonstrates the new satellite/sensor capabilities

Focus on:

- multi-byte data sets
- enhanced RGB display capabilities (with CIRA)
- ingest and display of non-standard products
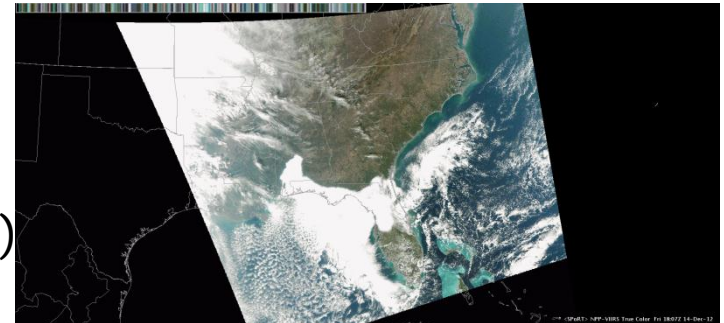
True color VIIRS data

Worked with NWS OST SEC to establish governance for the transition / base lining of externally developed AWIPS II plugins and tools

- **total lightning ATAN**
- **Base lined in AWIPS II by summer**

Leading efforts to train a community team of AWIPS II developers to support GOES-R and JPSS programs

- **first EPDT workshop at SPoRT (3/2013)**
- **15 developers**

Earth Networks

NALMA Source Density

pGLM

NALMA Flash Extent
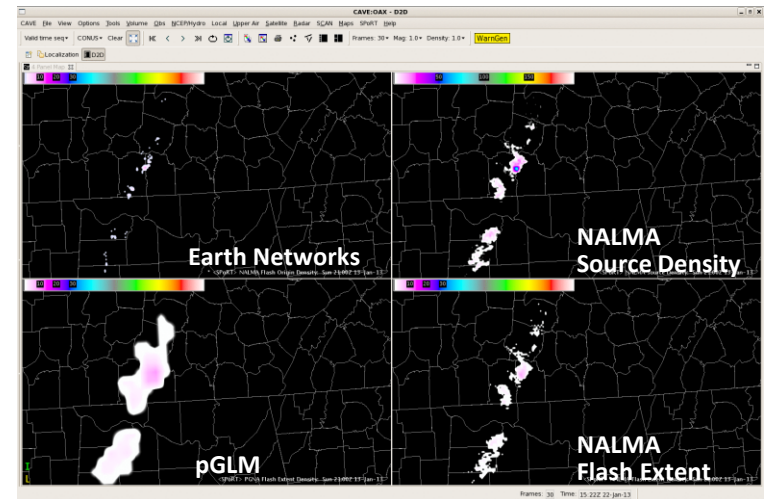
Total Lightning Data in AWIPS II

Operations Proving Ground

- **Use of ground-based total lightning products from SPoRT in numerous WFOs since 2003**

- **Rapid increases in total lightning signify a rapidly developing updraft - storms with stronger updrafts produce more lightning**

- **Led to concept of lightning "jump" (Schultz et al……)**

- **Forecaster feedback indicated that a "trending tool" would greatly enhance utility of SPoRT total lightning data**
  - developed a lightning tracking to support this need
  - submitted to Operations PG (3/2013)
  - supports more generic tracking meteogram under development by MDL
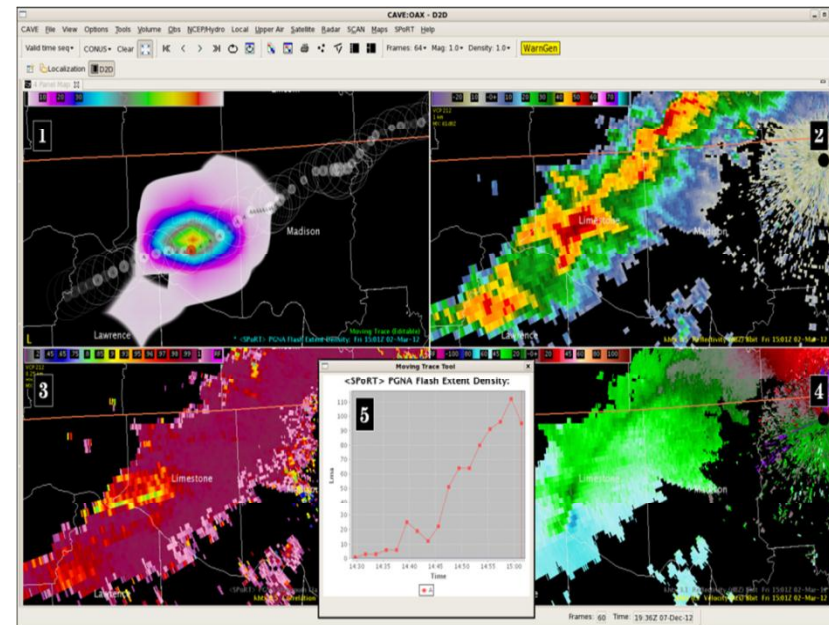
Forecaster use of the SPoRT Lightning Tracking Tool

transitioning research data to the operational weather community

Summary

SPoRT is an end-to-end transition to operations activity supported by NASA and NOAA

- Internally and externally developed products to address forecast issues
- Broad guidance and direction – external involvement
- Develop / refine solution in a "test bed" environment – involve end user
- Transition proven solutions to operational weather environment such as WFOs and National Centers
- Develop end user product training
- Conduct assessments and impact studies

Work collaboratively with other test beds and proving grounds

Explore transition through Operations Proving Ground

transitioning research data to the operational weather community